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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/352,959	07/14/1999	PAUL W. CAMPBELL	0100.9900940	2833

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VEDDER PRICE KAUFMAN & KAMMHOLZ
222 N. LASALLE STREET
CHICAGO, IL 60601

EXAMINER

VITAL, PIERRE M

ART UNIT	PAPER NUMBER
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2188

9

DATE MAILED: 07/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/352,959

Applicant(s)

CAMPBELL, PAUL W.

Examiner

Pierre M. Vital

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,6-12 and 17-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1,6,12 and 17 is/are allowed.
- 6) ☒ Claim(s) 7-11 and 18-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 July 1999 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Response to Amendment

1. This Office Action is in response to applicant's communication filed June 20, 2003 in response to PTO Office Action mailed March 17, 2003. The Applicant's remarks and amendments to the claims and/or the specification were considered with the results that follow.
2. Claims 1, 6-12 and 17-22 have been presented for examination in this application. In response to the last Office Action, no claims have been amended. No claims have been canceled or added. As a result, claims 1, 6-12, and 17-22 are now pending in this application.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 7 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakatsuka et al (US6,433,782) and Bogin et al. (US6,192,455).

As per claims 7 and 18, Nakatsuka discloses a processing module [abstract, line 2]; and memory operably coupled to the processing module, wherein the memory stores operational instructions that cause the processing module to [abstract, lines 2-3]; (a) translate a virtual address into an address [logical address translated to physical address; col. 9, lines 5-8]; (b) determine whether the address corresponds to translation memory space [determining which regions the data

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accessed by the processor belongs; col. 9, lines 13-16]; (d) translate the address into another address when the address corresponds to translation memory space; (e) caching the another address in the translation look aside [logical address is converted to physical address corresponding to graphics address by address converter unit; col. 8, line 66 – col. 9, line 39].

However, Nakatsuka does not specifically teach translating a virtual address into an address and caching the address and the another address in a translation look aside table when the address corresponds to the translation memory space as recited in the claims.

Bogin discloses translating a virtual address into an address [*translation table 143 has virtual to main memory address translation; col. 2, lines 46-49; col. 4, lines 5-8]* and caching the address [*GTLB 141 is a cache buffer of translation table 143; col. 4, lines 46-51*]; and also caching another address in the same translation look aside table when the address corresponds to the translation memory space [*AGP maps into physical address of main memory 145 which maps into physical address space of system memory 132; col. 4, lines 2-8; GTLB 141 has address references from the AGP memory 127 to a corresponding address in main memory 145 of system memory 132; col. 4, lines 46-51*].

It would have been obvious to one of ordinary skill in the art, having the teachings of Nakatsuka and Bogin before him at the time the invention was made to modify the system of Nakatsuka to include translating a virtual address into an address and caching the address and also caching another address in the same translation look aside table when the address corresponds to the translation memory space because it would have provided faster graphics data processing by allowing the operating system to provide a continuous block of AGP memory and references from the AGP memory that points to various locations in main memory to the graphics device [col. 4, lines 13-16, 24-27] as taught by Bogin.

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5. Claims 8-11 and 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakatsuka et al (US6,433,782) and Bogin et al. (US6,192,455) and further in view of Hays et al (US6,356,989).

As per claims 8 and 19, the combination of Nakatsuka and Bogin discloses the claimed invention as detailed above in the previous paragraphs. However, the combination of Nakatsuka and Bogin does not specifically teach indexing a page directory based on a first portion of the virtual address to retrieve a page directory entry; indexing a page table based on the page directory and a second portion of the virtual address to retrieve a page table entry as at least part of the address as recited in the claims.

Hays discloses indexing a page directory based on a first portion of the virtual address to retrieve a page directory entry; indexing a page table based on the page directory and a second portion of the virtual address to retrieve a page table entry as at least part of the address [*portion of the linear address is utilized to index to an entry in Page Directory 104; column 1, lines 45-58*].

It would have been obvious to one of ordinary skill in the art, having the teachings of Nakatsuka and Bogin and Hays before him at the time the invention was made to modify the system of Nakatsuka and Bogin to include indexing a page directory based on a first portion of the virtual address to retrieve a page directory entry; indexing a page table based on the page directory and a second portion of the virtual address to retrieve a page table entry as at least part of the address because it would have avoided subsequent processing by the paging unit by providing starting address of the page frame and statistical information about the page [col. 1, lines 55-57] as taught by Hays.

As per claims 9 and 20, Nakatsuka discloses determining whether the page table entry is in video graphics memory space [column 9, lines 13-22].

As per claims 10, 11, 21 and 22, Hays discloses caching and translating the page directory entry, the page table entry, and a third portion of the virtual address as the address [column 1, lines 55-58].

Allowable Subject Matter

6. Claims 1, 6, 12 and 17 are allowed over the prior art of record.

7. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record does not teach or suggest a physical address after a first translation requires further translation and receiving a second physical page address and utilizing the second physical page address and a portion of the virtual address to produce another physical address in that both the first translation and the other second physical address are both stored in the same translation look-aside table in combination with the other elements set forth in the claimed invention.

Response to Arguments

8. Applicant's arguments with respect to claims 7-11 and 18-22 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Applicant is required under 37 C.F.R. § 1.111 (c) to consider these references fully when responding to this action. The documents cited therein teach virtual to physical translation, graphics translation, and translation using lookaside table.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pierre M. Vital whose telephone number is (703) 306-5839. The examiner can normally be reached on Mon-Fri, 8:30 am - 6:00 pm, alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Kim can be reached on (703) 305-3821. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-7239 for regular communications and (703) 746-7238 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-9000.

Pierre M. Vital

Pierre M. Vital
July 16, 2003